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EFFECTIVENESS OF INSECTICIDES FOR THE CONTROL OF WHITE GRUBS IN TURF

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EFFECTIVENESS OF INSECTICIDES FOR THE CONTROL OF WHITE GRUBS IN TURF

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INTRODUCTION

White grubs frequently cause injury to turf in lawns, parks, cemeteries and golf courses throughout Ohio. However, in the past 10 to 15 years, the greatest damage to turf has occurred in a relatively narrow area extending through central Ohio from the southwest to the northeast.

Two groups of turf grubs are responsible for the damage. The first group involves several species of May beetles, *Phyllophaga*. The second consists of a single species, the northern masked chafer, *Cyclocephala borealis* Arrow.

Since a majority of the *Phyllophaga* species in Ohio have a 3-year life cycle, they are most destructive every third year. However, some injury may occur in some areas every year.

The *Cyclocephala* grubs have a 1-year life cycle and thus can appear every year in the same location. However, this does not generally occur. A light infestation usually is succeeded by a rather high level of grub population for one season. This is followed with a low level of population or total absence of any larvae in the area for a few years.

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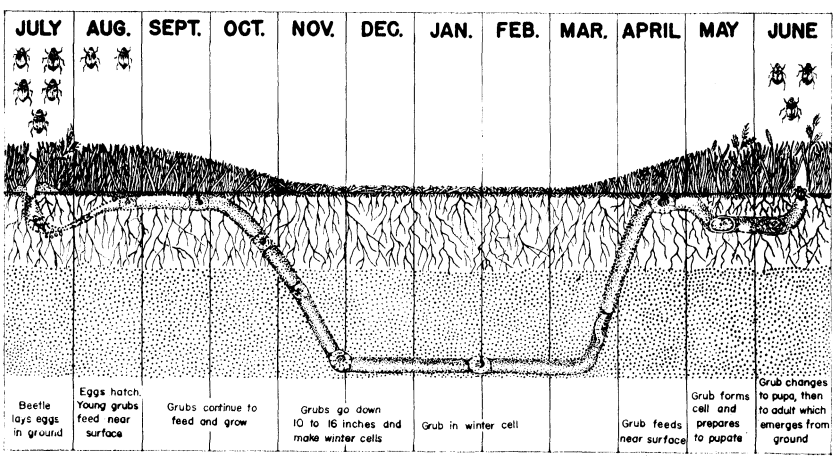
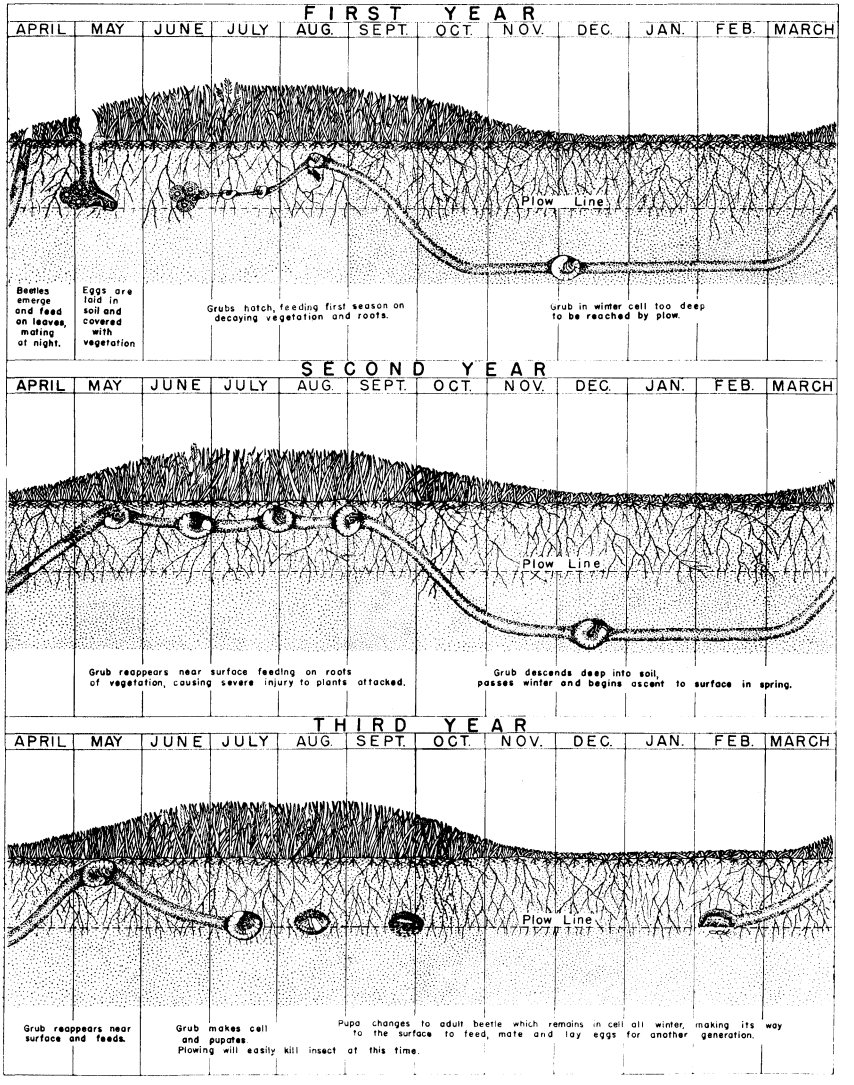


One-year life cycle of northern masked chafer.

MATERIAL AND PROCEDURE

In the past 15 years, experiments were established in many locations in Ohio to study the effectiveness of different insecticides and various rates of applying these insecticides in controlling white grubs.

Liquid applications were made with a sprinkling can. Dry insecticides were applied to the soil surface with a fertilizer spreader, a hand sifter, or a knapsack seeder.



Three-year life cycle of May beetle.

Grub population records were taken each year in August, September, or early October. In the small plots, grub population was obtained by counting the number of larvae found in three soil samples. The samples were 4 inches in diameter and were taken to a depth of 4 inches or more, depending upon the depth of the larvae at the time the plots were surveyed. In the larger plots, groups of three samples were taken in four different locations within the plot area.

The populations of *Phyllophaga* and *Cyclocephala* grubs varied in relative size from year to year. In some years one group was predominant and in other years the other group was most plentiful.

DISCUSSION OF RESULTS

Results of the tests indicated that populations of both grubs were low in all but two tests at the last survey date. However, despite the low population levels, birds and skunks had invaded the areas to feed on the grubs before the plots were surveyed.

The data indicated that the insecticides were highly effective in all tests for one generation of *Phyllophaga* grubs. In seven tests, all insecticides were effective for two generations and in two other tests, DDT, chlordane, and heptachlor were effective for three generations of the

Insecticides were applied with power sprayer equipped with a boom (above), hand sprinkling can, and fertilizer spreader.

Phyllophaga grubs. All insecticides were effective in eliminating the *Cyclocephala* population in every test.

EFFECTIVENESS OF INSECTICIDES

Aldrin: Aldrin was applied as a 2, 4, 5, and 10 percent granular material in one or more of 13 tests studied. The rate of application was 2, 3, 4, and 10 pounds per acre.

At the last survey date, the insecticide was in the soil for periods ranging from 13 months to 60 months. This time period indicates that the insecticide was in the soil for more than one complete cycle of the May beetle and for five generations of the northern masked chafer.

All formulations and rates of application of aldrin gave excellent control of both types of white grubs.

Chlordane: Chlordane was applied as a 5 and 10 percent granular material, as a 5 percent dust, and as a 40 percent wettable powder. Each formulation was used in one or more of the 12 tests. The insecticide was applied at the rate of 5 pounds of the actual material per acre in nine tests, and at rates of 2.5, 4, and 10 pounds in three tests.

The 4-pound rate of a 5 percent granular material was in the soil for 17 months. It was only 33.3 percent effective in controlling May beetle larvae. In another test, the 2.5-pound rate of a 5 percent dust was 100 percent effective after being in the soil for 18 months. These results indicate that the 4-pound rate may have been applied when many of the larvae were nearly full grown and thus the insecticide was not as effective.

The 5-and 10-pound rates of the 40 percent wettable powder were 100 percent effective for 146 months or for more than 12 years. This means that the insecticide was in the soil for 3 generations of May beetles and for 12 generations of the northern masked chafer.

DDT: A 50 percent DDT wettable powder applied at the rate of 12.5 and 25 pounds of the actual material per acre was effective in eliminating the white grubs after they were in the soil for 146 months. The 5 percent granular material applied at the rate of 25 and 50 pounds per acre was also effective after being in the soil for 76 months.

Dieldrin: Dieldrin was applied as granules in 20 tests. The 2 percent granular material was applied at rates of 2 and 3 pounds of the actual material per acre, the 4 percent at 4 pounds per acre, the 5 percent at rates of 2 and 3 pounds per acre, and the 10 percent at rates of 2 and 4 pounds per acre.

All rates of the different formulations were equally effective in controlling both types of white grubs for periods varying from 5 to 76 months.

Endrin: Endrin was applied as a 2, 4, and 5 percent granular material in one or more of the eight tests studied. The rate of application was at 2, 3, and 4 pounds of the actual material per acre. The insecticide was effective for periods ranging from 17 months to 76 months. This indicates that endrin was in the soil for two generations of May beetles and six generations of the northern masked chafer.

The data also indicated that formulations had no effect upon the results obtained from the tests.

Heptachlor: A 5 percent granular material was applied at rates of 2, 3, and 4 pounds of the actual material per acre and 25 percent wettable powder was applied at rates of 1, 5, 10, and 20 pounds per acre.

The insecticide applied as wettable powder was 100 percent effective after being in the soil for 146 months. The granular materials were in the soil for a much shorter period (6 to 73 months). All applications of granular material were effective in eliminating both species of white grubs from the soil except the 2-pound rate, which was only 66.7 percent effective against May beetle larvae. Results of this kind are common when plots are surveyed within 24 months of application date.

Telodrin: Telodrin was applied as a 2 percent granular material at the rate of 2 pounds of the actual toxicant per acre in two tests, as a 5 percent granular at 2-and-3-pound rates, and as a 1-¼ pound per gallon emulsifiable concentrate in one test.

All formulations and rates of application were effective in eliminating both species of white grubs for 18 to 47 months.

SUMMARY

These tests indicated that aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, and Telodrin were highly effective in controlling *Phyllophaga* species for as long as 146 months. All of these insecticides effectively controlled the *Cyclocephala* species for as long as 13 generations.

The data also indicated that the amount of actual toxicant in the formulation rather than the formulation is the important factor in the control of these turf grubs. None of the insecticides are 100 percent effective against larvae in the soil at the time of application but all subsequent populations are effectively controlled.